What is claimed is:

1. A flexible device comprising a metallic element including high strain portions and lesser strain portions, wherein the high strain portions are to be subjected to levels of strain during use increased with respect to strain levels in the lesser strain portions, the high strain portions comprising a material which, under predetermined operating conditions to which the device will be subjected when deployed within the body, is stabilized in a martensite phase and the lesser strain portions comprise a material which, under the predetermined operating conditions, is in an austenite phase.

2. The device according to claim 1, further comprising a transition portion disposed between and providing a transition between the high strain and lesser strain portions.

3. The device according to claim 1, wherein the element is formed substantially of Nitinol.

4. The device according to claim 1, wherein an austenite transition temperature of the high strain portion is greater than an austenite transition temperature of the lesser portion.

5. The device according to claim 1, wherein the device is a medical device to be inserted within a living body.

6. The device according to claim 5, wherein an austenite transition temperature of the high strain portion is greater than a body temperature of the living body into which the device is to be inserted.

7. The device according to claim 6, wherein the austenite transition temperature of the high strain portion is greater than 37 C°.

8. The device according to claim 1, wherein the high strain portion is a plastically deformed surface portion of the element.

9. The device according to claim 1, wherein the high strain portion is a surface portion of the element which has been treated with an ion implantation process.

10. The device according to claim 9, wherein the high strain portion includes a portion of a surface of the element into which nitrogen ions have been implanted.

11. The device according to claim 9, wherein the high strain portion includes at least a portion of a surface of the element into which ions of one of Pd, Pt, Au, Cu, Hf, Zr, Nb, Ta and Ti have been implanted.

12. The device according to claim 1, wherein the high strain portion is a doped surface portion of the element.

13. The device according to claim 12, wherein the high strain portion includes at least a portion of a surface of the element in which one of Pd, Pt, Au, Cu, Hf, Zr, Nb, Ta and Ti has been added.

14. The device according to claim 1, wherein a titanium concentration in the high strain portion is greater than a titanium concentration in the lesser strain portion.

15. The device according to claim 8, wherein the plastically deformed portion is one of a shot peened surface and an extruded surface of the element.

16. A medical implant comprising a structural element defining a shape of at least a portion of the implant, a super-elastic core portion of the element being primarily formed of Nitinol which, at body temperature, is in a substantially austenitic phase and a fatigue resistant surface portion primarily formed of Nitinol which, at body temperature, is substantially Martensite phase stabilized.

17. The implant according to claim 16, wherein the element is one of a wire, tubing and a sheet.

18. The implant according to claim 16, wherein at least a portion of a surface of the element is plastically deformed.

19. The implant according to claim 18, wherein the plastically deformed portion of the surface is one of shot peened and low temperature extruded.

20. The implant according to claim 16, wherein the fatigue resistant surface portion is treated with an ion implantation process.

21. The implant according to claim 16, wherein the fatigue resistant surface portion is doped with one of Pd, Pt, Au, Cu, Hf, Zr, Nb, Ta and Ti.

22. The implant according to claim 16, wherein the fatigue resistant surface portion is a cladding layer formed around the super-elastic core portion.

23. The implant according to claim 19, wherein the fatigue resistant surface portion has a ratio of nickel and titanium modified with respect to that of the super-elastic core portion.

24. A method of forming an element of a medical device comprising the steps of:

forming an element of the device of Nitinol;

impressing a memorized shape on the element, wherein the memorized shape is a shape the element is to assume when in an operational configuration; and

treating a high strain portion of the element so that the high strain portion is substantially Martensite phase stabilized under expected operating conditions of the device, wherein untreated portions of the element are in a substantially austenitic phase under the expected operating conditions.

25. The method of claim 24, wherein the high strain portion is substantially Martensite phase stabilized by plastic deformation.